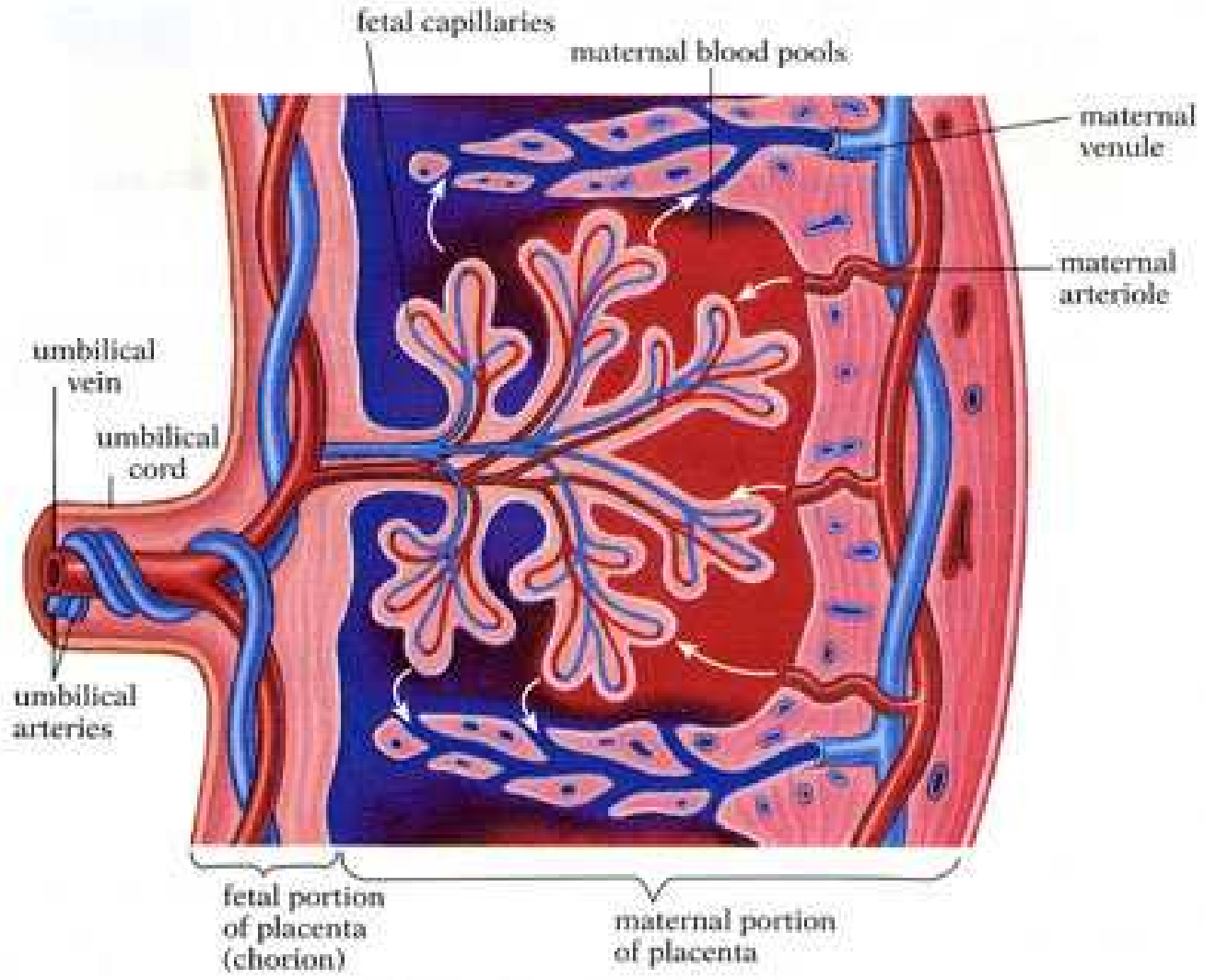
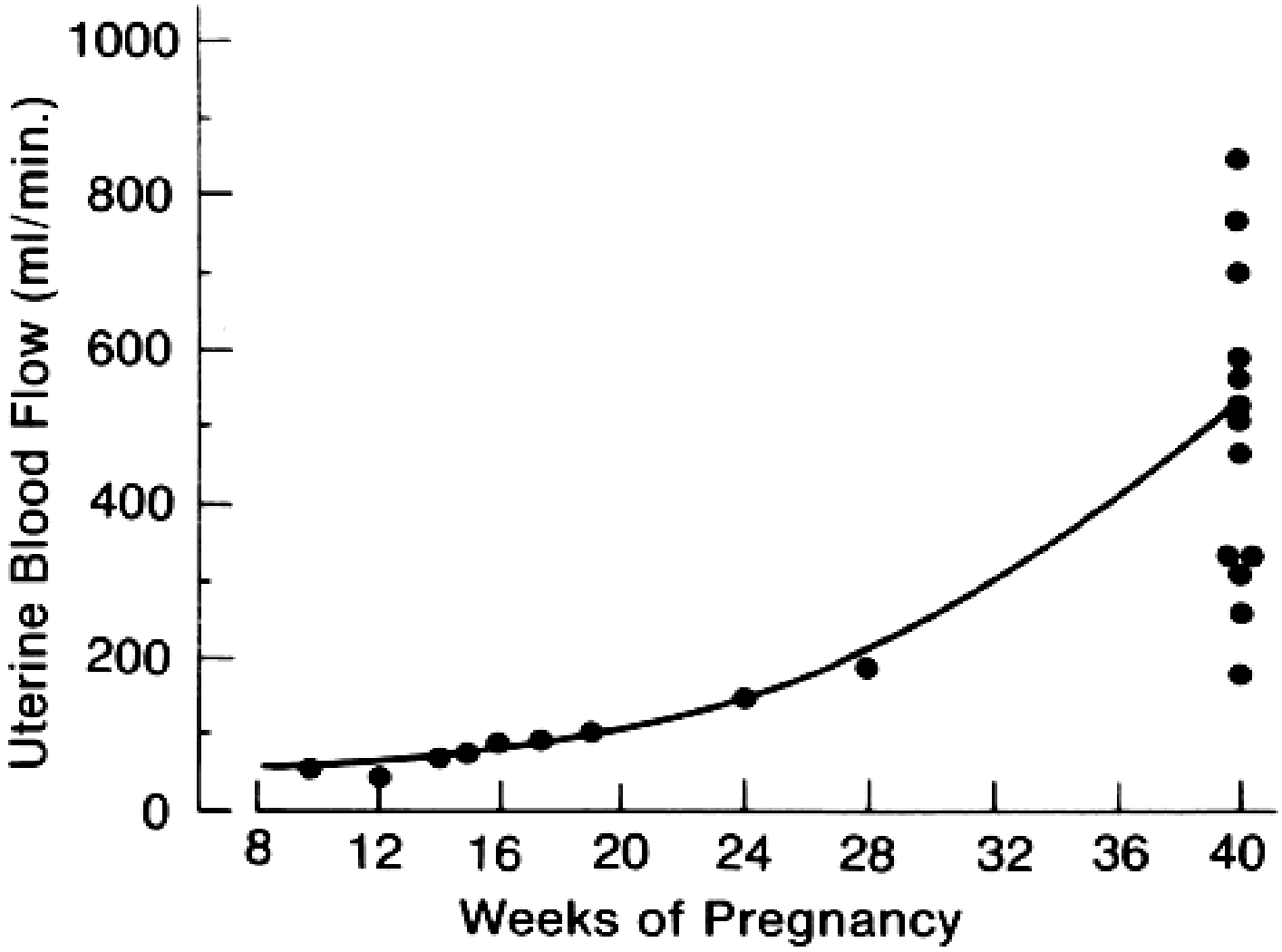
Obstetric Haemorrhage

Jim Bamber

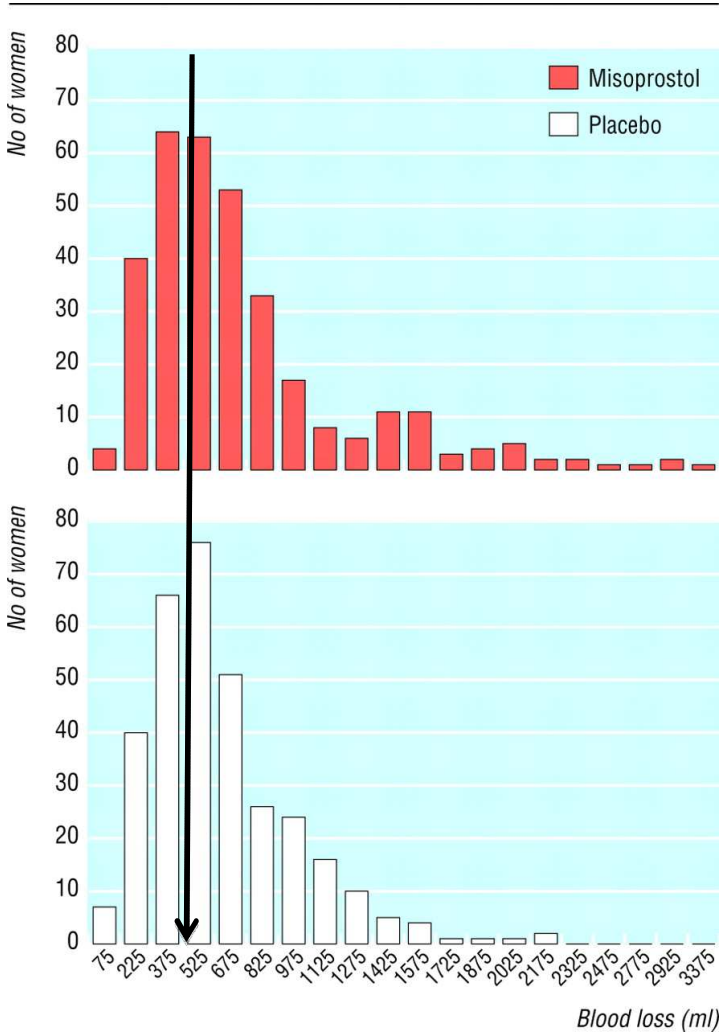
Overview

- What is obstetric haemorrhage?
- How common is it?
- What are the main causes?
- Why is it important?
- How well do we recognise it?
- How should we manage it?
- The importance of team work


fetal capillaries
maternal blood pools
maternal venule
maternal arteriole
umbilical vein
umbilical cord
umbilical arteries
fetal portion of placenta (chorion)
maternal portion of placenta


Uterine Blood Flow (ml/min.)
1000
800
600
400
200
0
8
12
16
20
24
28
32
36
40
Weeks of Pregnancy

Distribution of postpartum blood loss in women according to treatment.



Hø j L et al. BMJ 2005;331:723

“Midwives and doctors underestimate blood loss at delivery by 30 – 50%”

Glover P. Blood loss at delivery: how accurate is your estimation? *Aust J Midwifery* 2003;16:21-4

What is it? Some definitions

- **WHO (2012)**
  PPH – Blood loss **≥ 500mls** within 24 hours of birth
  Severe PPH – Blood loss **≥ 1000mls** within 24 hours
- **ACOG (2006)**
  PPH – Blood loss **≥ 1000mls following CS**
- **Scottish Confidential Audit of Severe Maternal Morbidity (2007)**
  Major Obstetric Haemorrhage - Blood loss **≥ 2500mls** or blood transfusion ≥ 5 units or treatment for coagulopathy
- **British Committee for Standards in Haematology (2006)**
  Massive blood loss =
  Blood loss at rate of **150ml per minute**
  Loss of **50% Blood Volume** in 3 hrs
  Loss of one Blood Volume in 24hr

How common is it?

Antepartum haemorrhage 2%

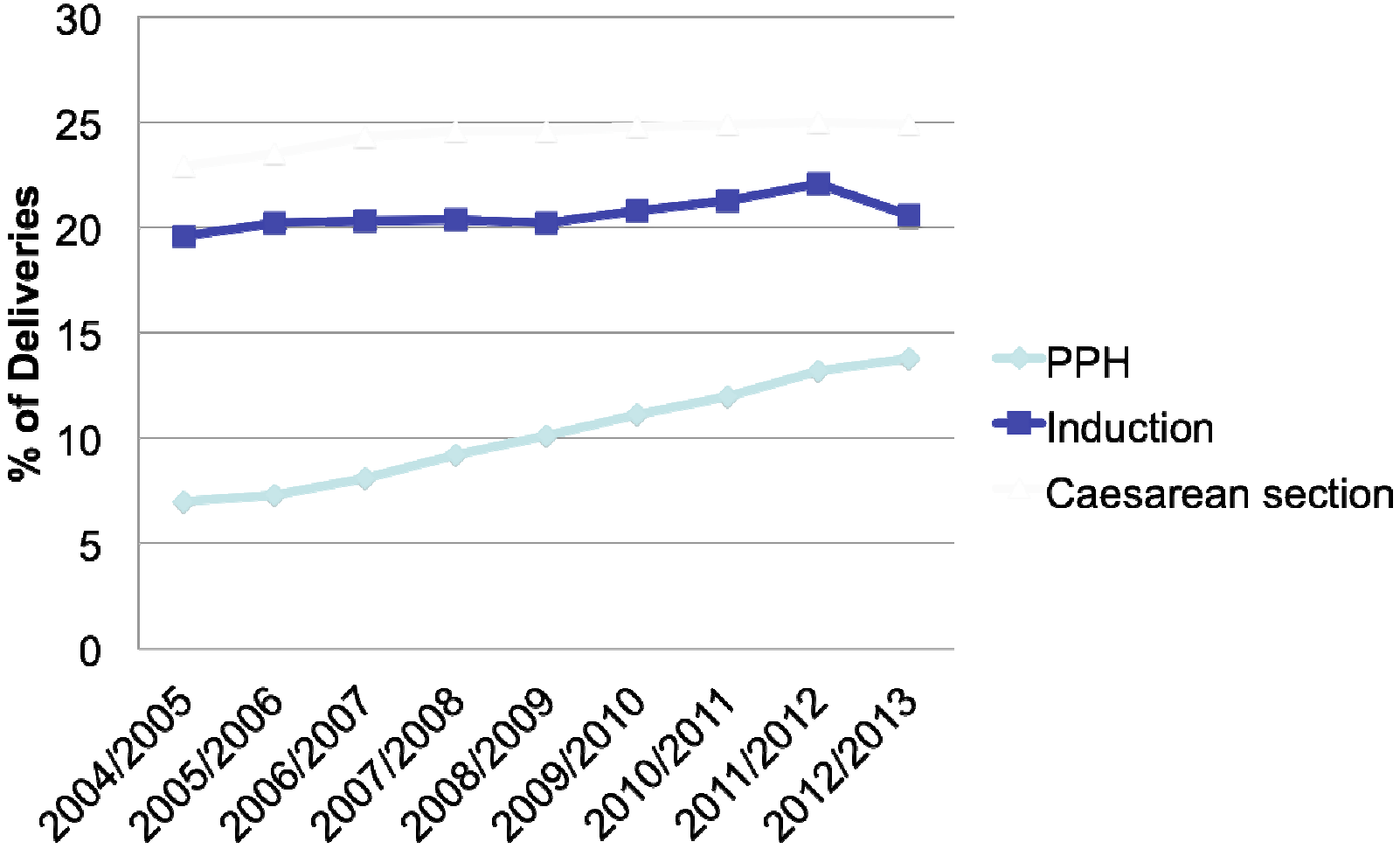
Postpartum haemorrhage 13%

NHS Maternity Statistics, England (2011-12)

Massive obstetric haemorrhage 0.6%

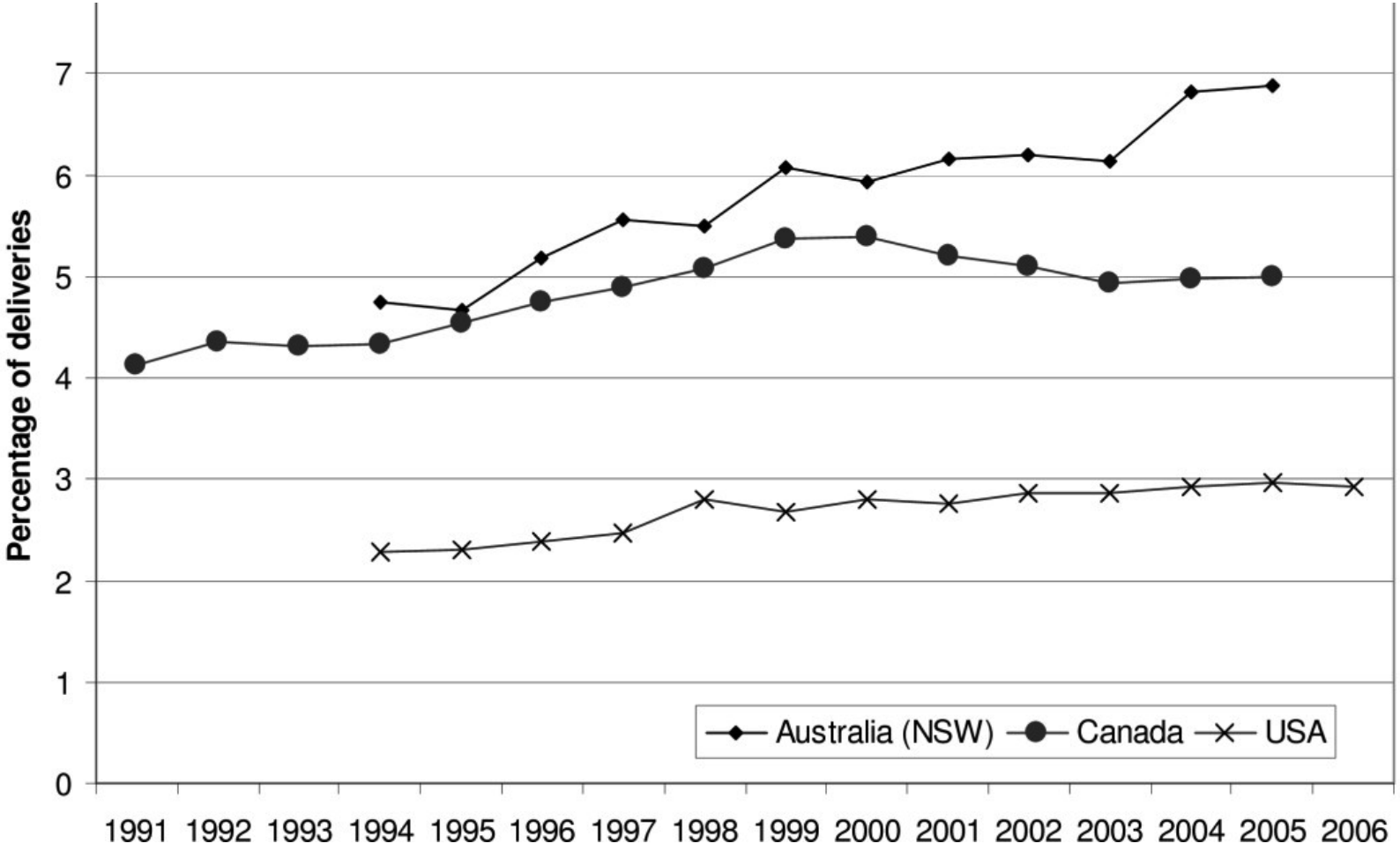
Scottish Confidential Audit of Severe Maternal Morbidity 2011

PPH in England 2004-2013



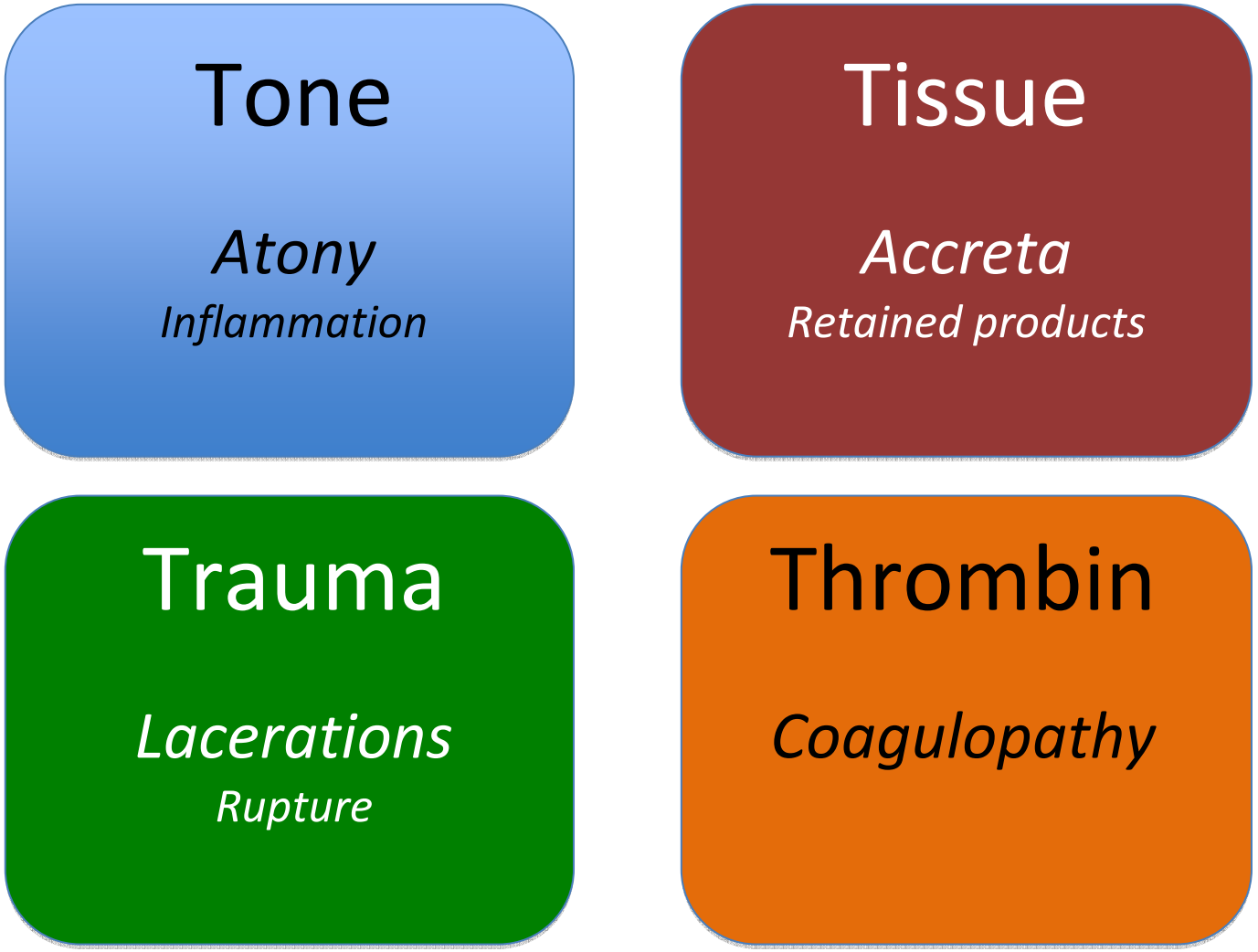
NHS Maternity Statistics, HSCIC

PPH in Australia, Canada and USA

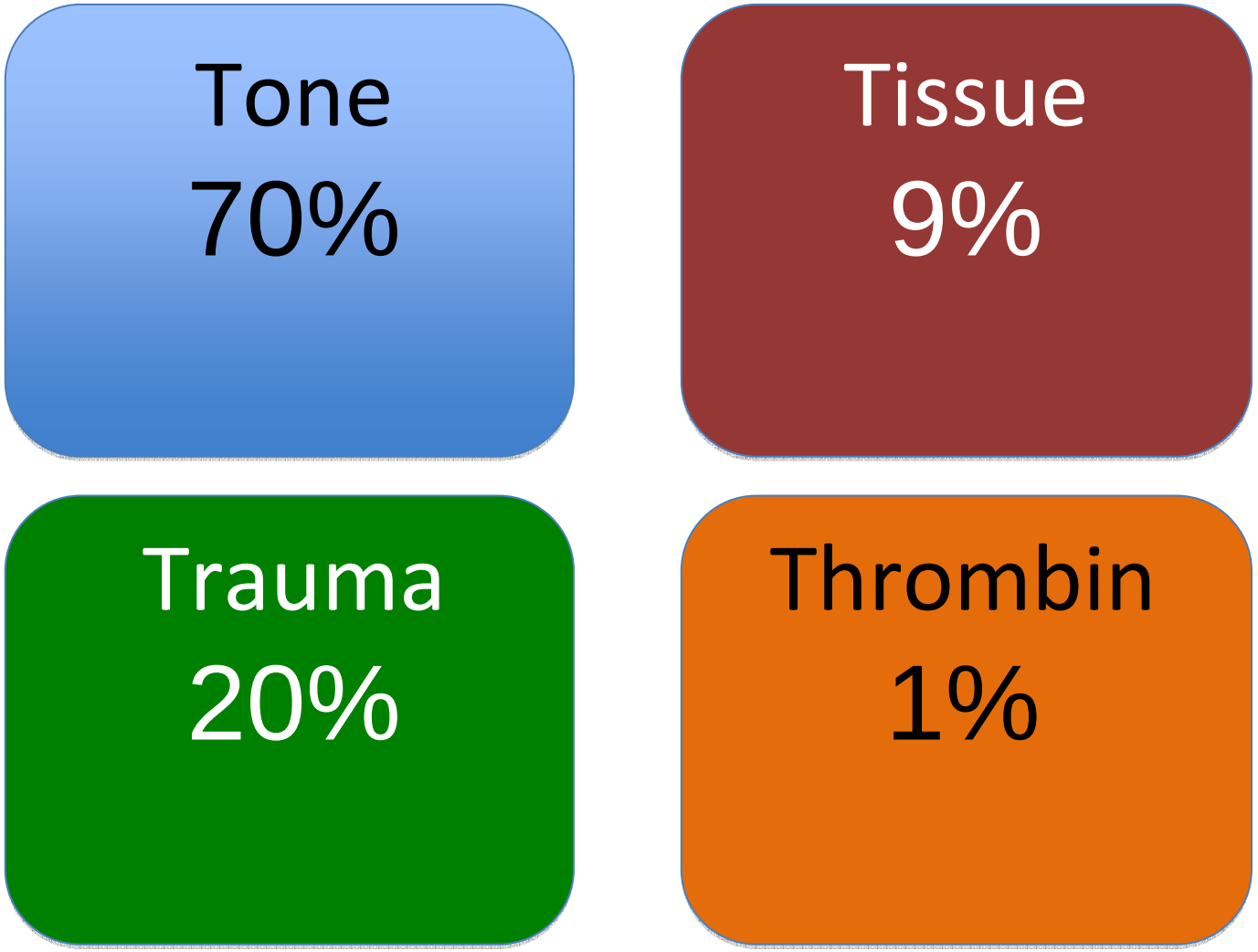


Knight et al 2009

What are the causes of PPH



Causes of PPH



- Obstetric haemorrhage is common
- Most haemorrhage is post partum
- Most PPH are due to an atonic uterus
- Women can die from PPH

THE TIMES

Failings that led to death of woman, 45, after C-section to be laid bare

Lucy Bannerman and **Chris Smyth**
Last updated at 12:01AM, September 27 2012

Failings in maternity services at a embattled hospital are to be laid bare in court, after a mother bled to death following an elective Caesarean.

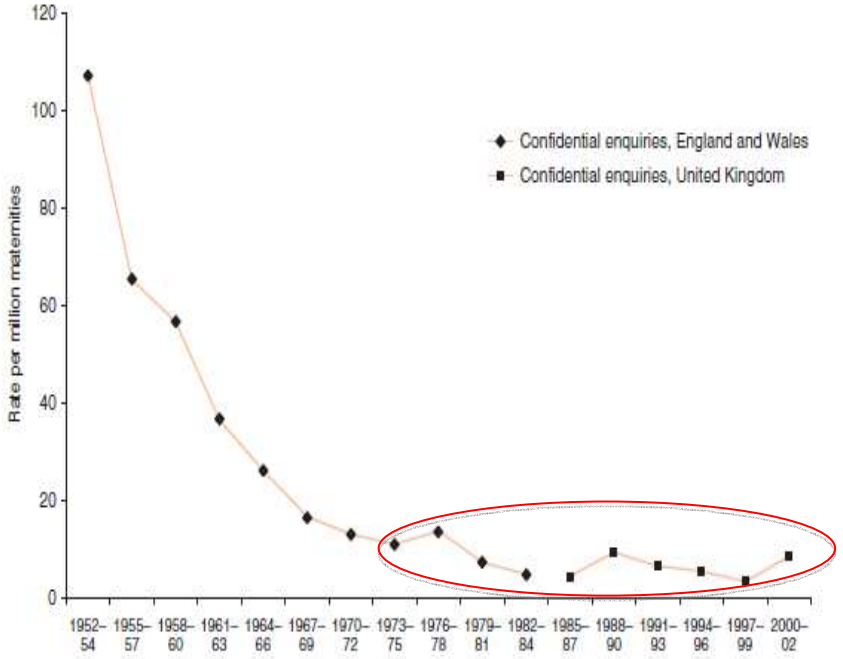
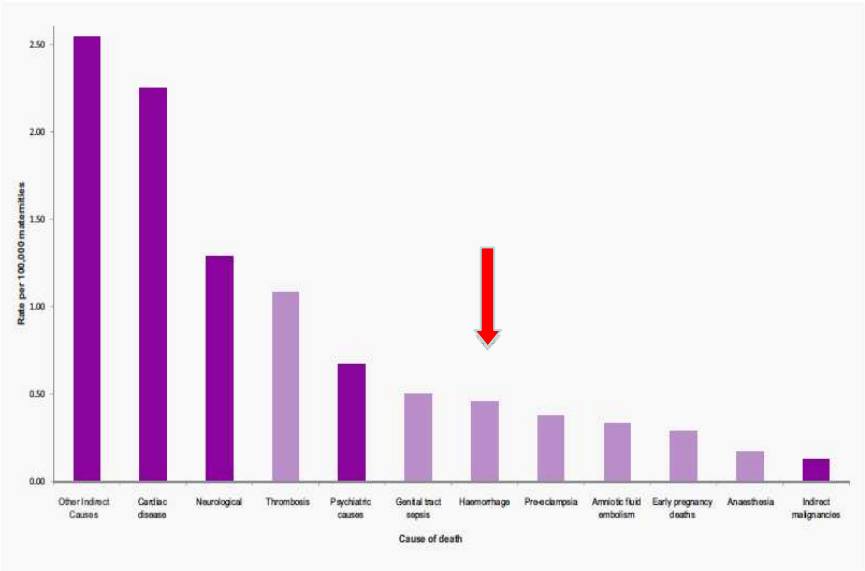


Figure 4.1 Maternal mortality for deaths due to haemorrhage; England and Wales 1952–84; United Kingdom 1984–2002

Figure 2.6: Maternal mortality by cause 2010–12



Solid bars indicate indirect causes of death, half tone bars show direct causes of death

What to do

- Prepare
- Recognise
- Resuscitate
- Stop

Be Prepared

Does your unit have:

- A major haemorrhage trolley?
- A major haemorrhage protocol?
- Immediate access to O neg blood?
- Obstetric emergency drills?

Have you risk assessed *your* patient ?

Risk factors for uterine atony

Intrinsic factors

- Age > 35 years
- Obesity
- Previous postpartum haemorrhage
- Antepartum haemorrhage (abruption or praevia)
- *Antenatal anaemia*

Factors associated with uterine overdistension

- Multiple pregnancy
- Polyhydramnios
- Fetal macrosomia

Labour-related factors

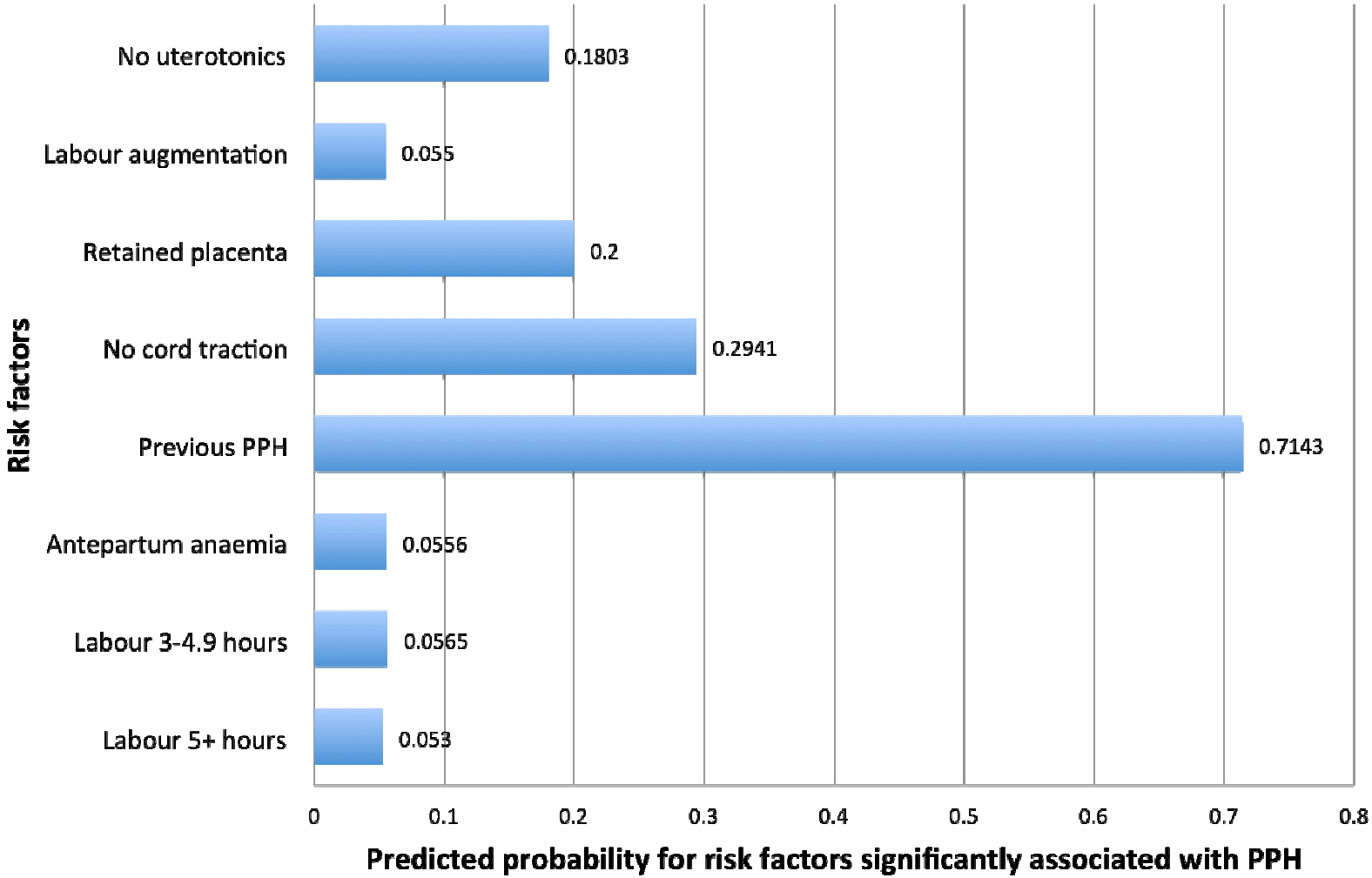
- Induction of labour
- Prolonged labour
- Precipitate labour
- Oxytocin augmentation
- Manual removal of placenta

Use of uterine relaxants

- General anaesthesia with halogenated agents
- Magnesium sulphate

Adapted from Breathnach F, Geary M: in A Textbook on Postpartum Hemorrhage. B-Lynch C, Louis K (eds): Sapiens Publishing 2004

The most important risk factors

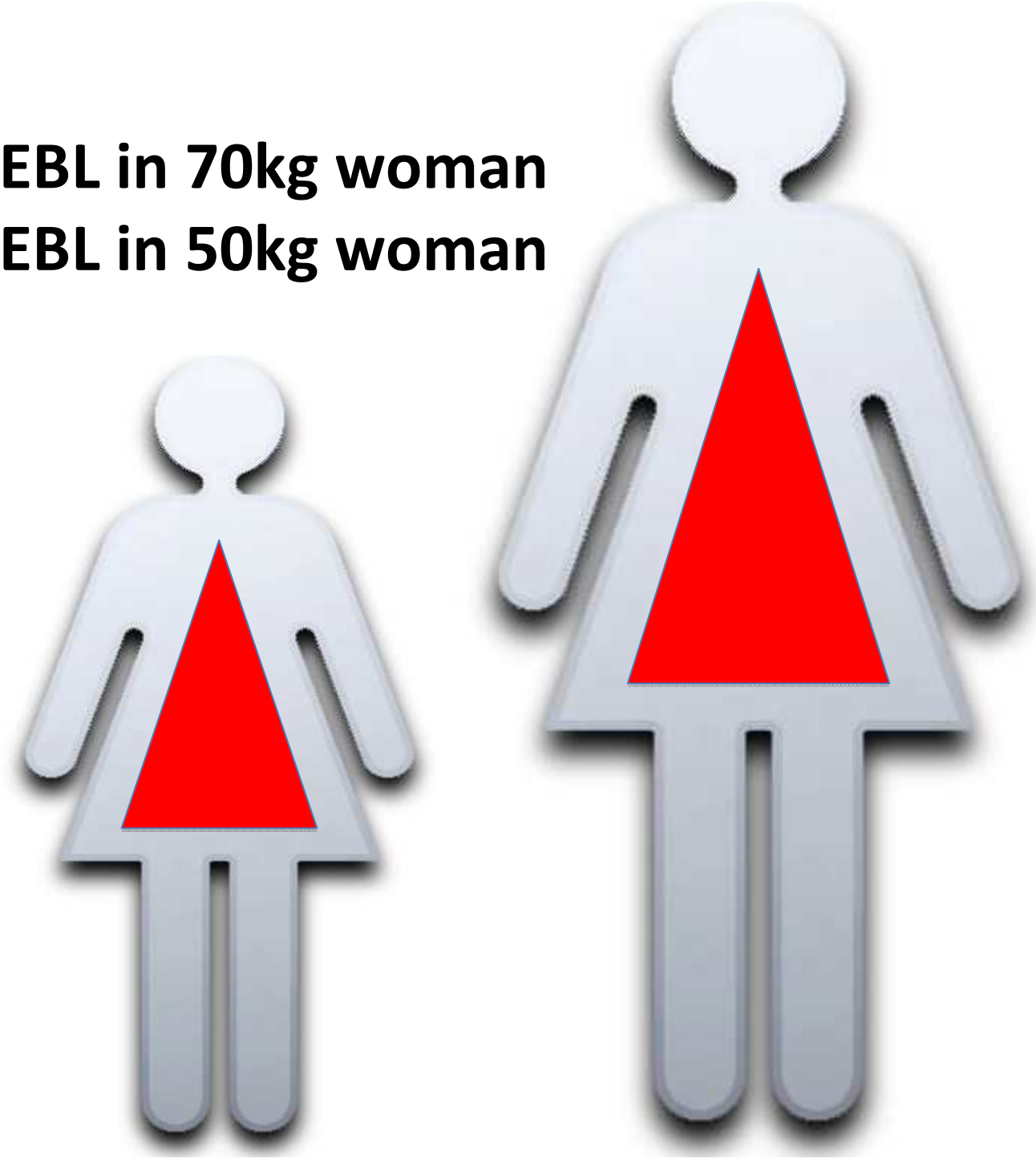


Recognise and Communicate

- Measure – remember EBL underestimated by 50%
- Size matters: Consider EBL relative to body size
- Observation is important
- Communicate – let everyone know

1400mls = 20% EBL in 70kg woman

1000mls = 20% EBL in 50kg woman



Observations

Do

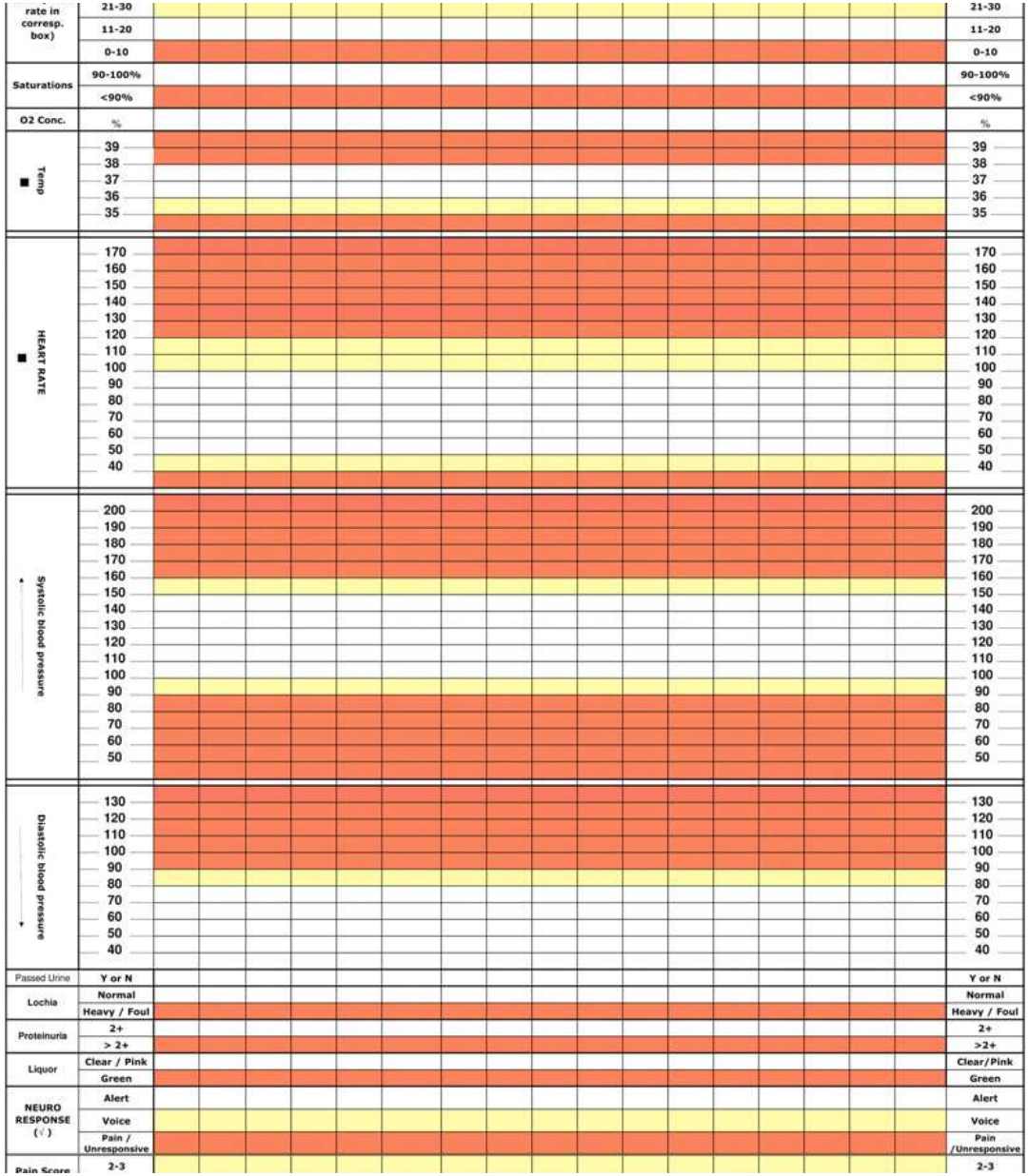
Early

Regularly

Completely

Refer

Act



How to recognise major obstetric haemorrhage

- Capillary refill
- Respiratory rate
- Pulse rate
- Urine output
- Blood pressure

How to recognise massive obstetric haemorrhage

Table 1

Classification of hemorrhage

	Class			
Parameter	I	II	III	IV
Blood loss (ml)	<750	750–1500	1500–2000	>2000
Blood loss (%)	<15%	15–30%	30–40%	>40%
Pulse rate (beats/min)	<100	>100	>120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate (breaths/min)	14–20	20–30	30–40	>35
Urine output (ml/hour)	>30	20–30	5–15	Negligible
CNS symptoms	Normal	Anxious	Confused	Lethargic

Modified from Committee on Trauma [4]. CNS = central nervous system.

How to recognise massive obstetric haemorrhage

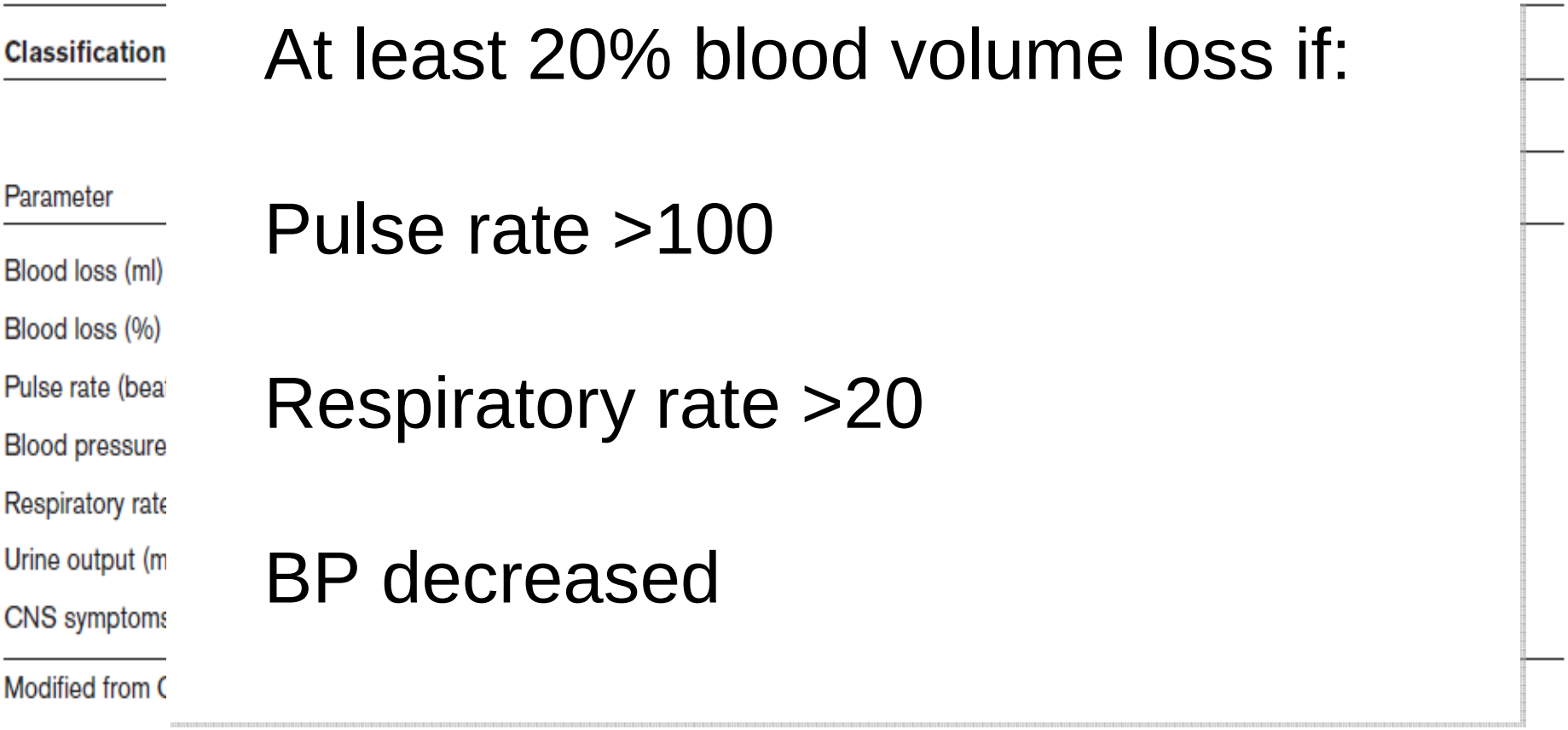


Table 1

Classification

Parameter

Blood loss (ml)

Blood loss (%)

Pulse rate (bea

Blood pressure

Respiratory rate

Urine output (m

CNS symptoms

Modified from C

At least 20% blood volume loss if:

Pulse rate >100

Respiratory rate >20

BP decreased

Management of Major Obstetric Haemorrhage

- Be prepared
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components
  - Communication
  - Resuscitation
  - Monitoring
  - Treatment

Communication

- Get Help
- Remember patient and partner
- Senior midwife, obstetrician and anaesthetist
- Blood transfusion and duty haematologist
- Theatre Team
- Portering services
- Delegate record keeping

Cambridge University Hospitals NHS
NHS Foundation Trust

Massive Blood Loss in Adults

4 litres in 24 hours 2 litres in 3 hours > 150ml/min

Get help

Contact senior member of clinical team. Contact senior ward nurses
Contact portering services

Contact Transfusion **ext 58405**

Ask Transfusion to **'initiate major blood loss protocol'**

Assess ABC

IV access

2 large cannula

Send blood samples, cross-match, FBC, coagulation, biochemistry
Consider arterial blood gas measurement

Send FBC and coagulation samples after every 5 units of blood given

Resuscitate

IV warm fluids – crystalloid or colloid

Give Oxygen

Give blood

Blood loss >40% blood volume is immediately life-threatening

Give 4 units via fluid warmer. Aim for Hb>8g/dl

Give Group O Rh D negative if immediate need
and/or blood group unknown

Blood Transfusion lab will provide group specific/cross-matched red cells as required

Before Tranfusion
- Check Patient ID
- Use wristbands
- PBARS

Blood loss >40% Blood volume
- 1500–2000mls loss
- Pulse > 120, RR > 30
- Hypotensive
- Urine < 20mls/h

Prevent coagulopathy

Anticipate need for platelets and FFP after 4 units blood replacement and continuing bleeding

Give Primary Major Haemorrhage (MH) Pack

Order Secondary Major Haemorrhage (MH) Pack

Correct hypothermia

Correct hypocalcaemia (keep ionised Ca > 1.13mmol/L)

Contact Haematologist

Primary MH Pack
- Blood 5 units
- FFP 4 units

Secondary MH Pack
- Blood 5 units
- FFP 4 units
- Platelets
- Cryoprecipitate

Reassess and document

Get help to stop bleeding

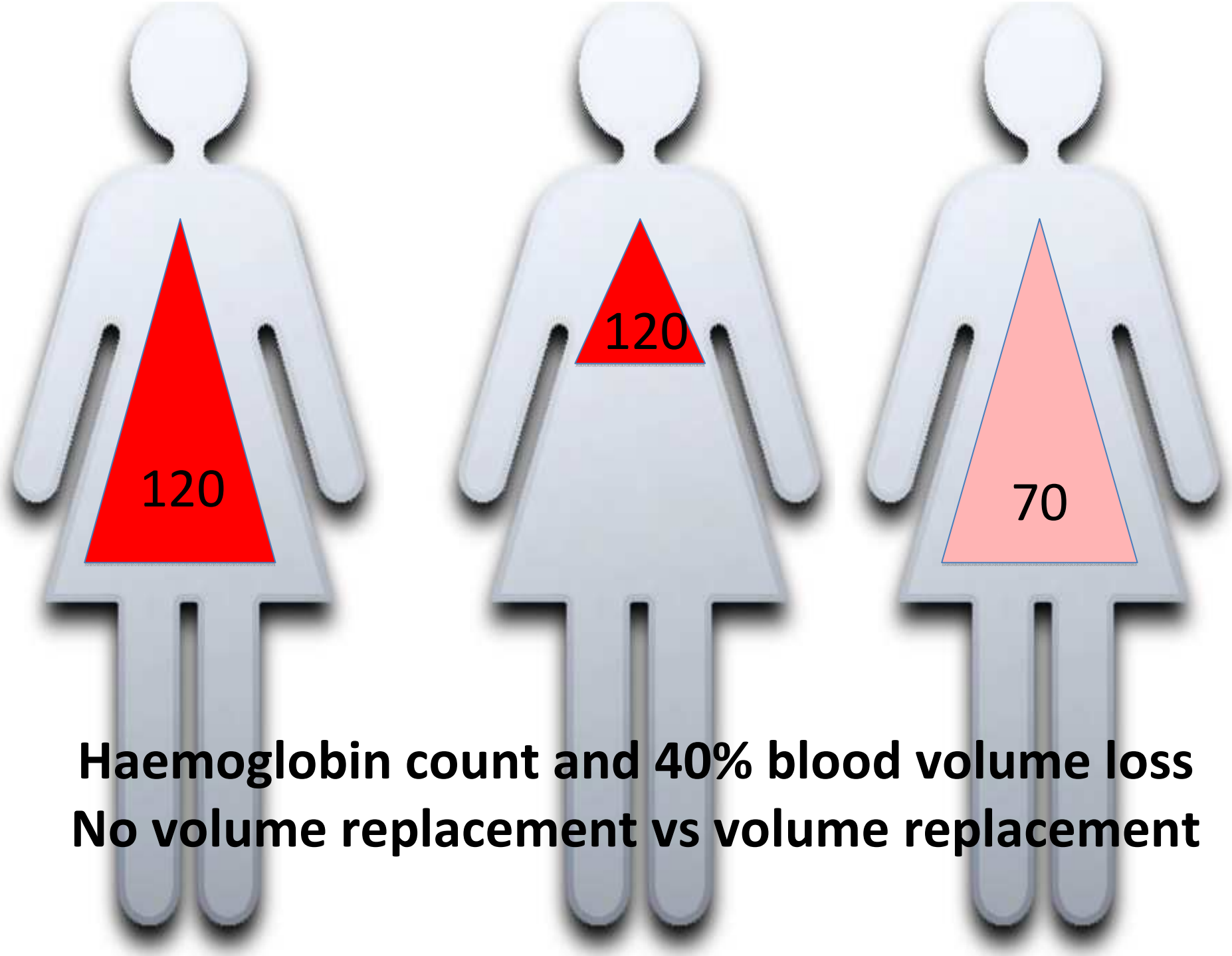
Contact surgeons, gastroenterologists, obstetricians as appropriate

v1 02/10

Resuscitation

- ABC
- Oxygen
- Major Haemorrhage Trolley
- IV access and blood samples
- Near-patient testing
- IV fluids
- O Neg Blood

Near patient testing pitfalls



Haemoglobin count and 40% blood volume loss
No volume replacement vs volume replacement

Fluid replacement

How much blood can you afford to lose?

- Blood is vital for oxygen delivery to organ cells
- Organ cell damage occurs with 50% blood volume loss if **NO** fluid replacement
- Organ cell damage does not occur until 100% blood volume loss if given equivalent fluid replacement

GIVING JUST FLUID CAN SAVE A LIFE

Average blood volume in 3rd trimester = 6L

Haemoglobin = 115 g/L

Blood loss = 50% of blood volume
No fluid replacement

Haemoglobin = 115 g/L

Blood loss = 50% of blood volume

But with fluid replacement

Haemoglobin = 56 g/L

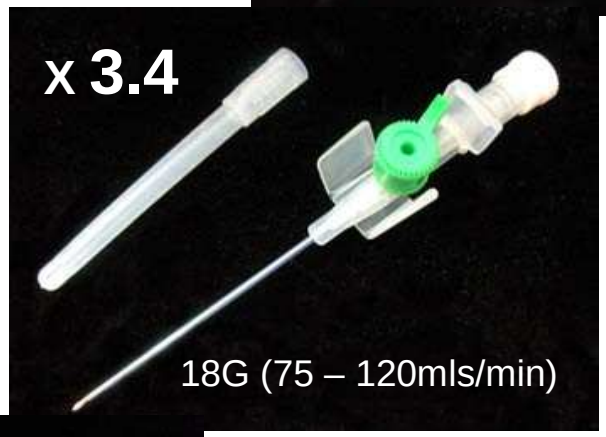
Which Fluid?

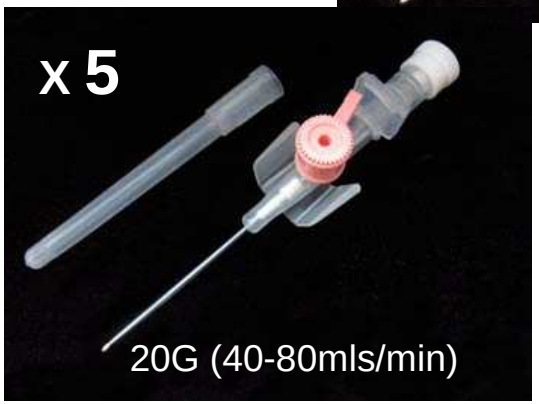
Crystalloid *vs* Colloid

How much fluid?

3 Fluid
to
1 Blood

=





Relative flow rates

Cannula size matters!

What's in Blood?

- Plasma volume: Replace after 1L loss (fluid replacement)
- Red cells: Replace after 2L loss (e.g. O neg blood)
- Coagulation factors/Platelets: Replace after 5L loss

Fibrinogen, Platelets and Clots

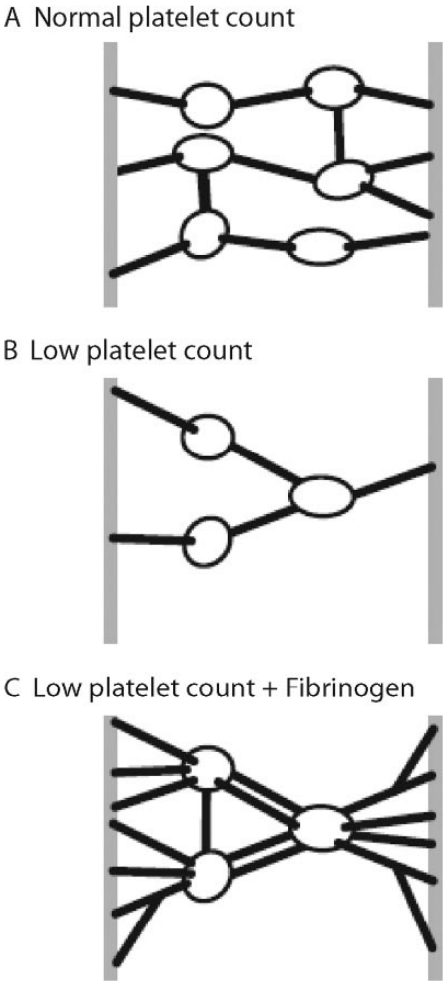
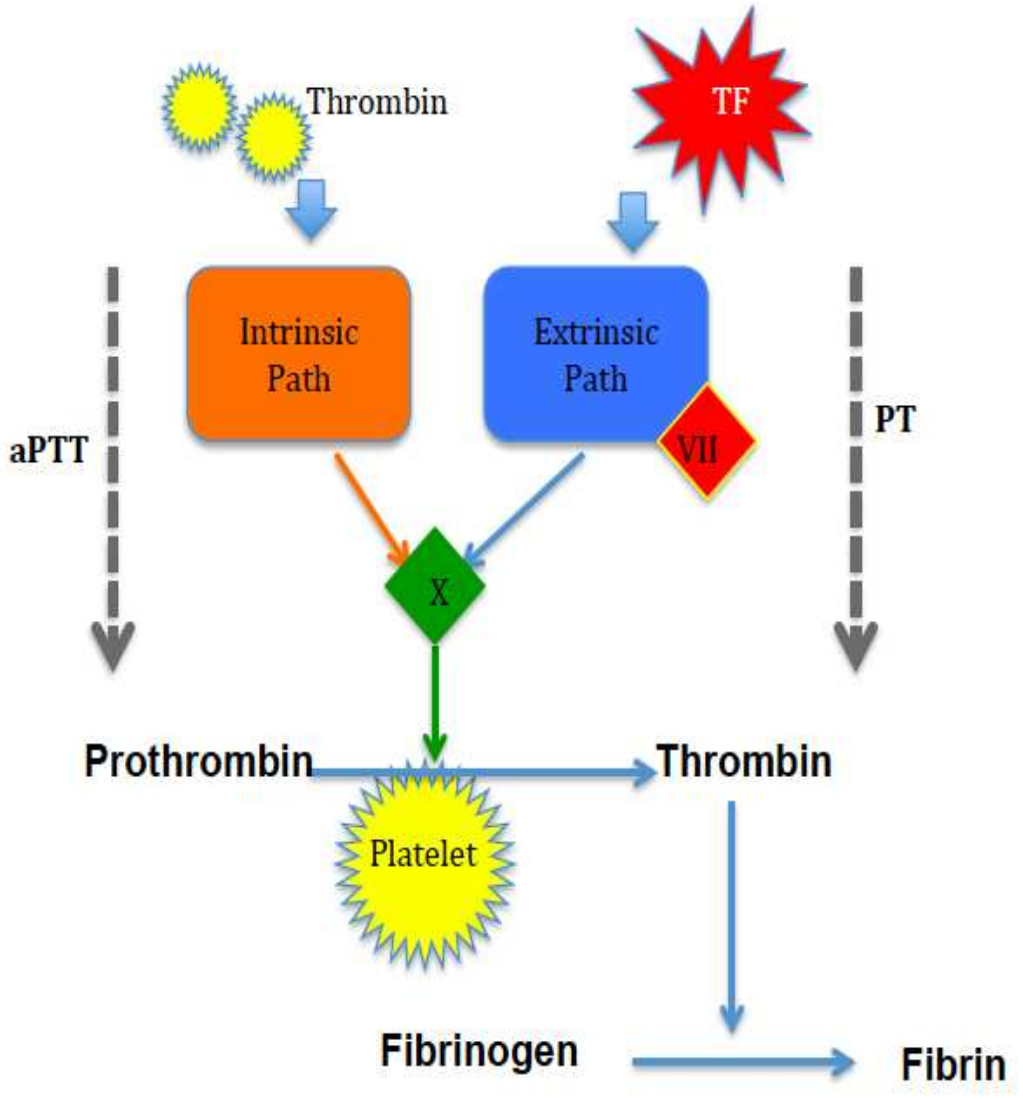


Figure 5. The relationship between platelets and fibrinogen during blood clotting. Panel A, normal clot firmness is generated by normal levels of platelet (open circles) and fibrin(ogen) (black lines); Panel B, reduced clot firmness is observed when platelet and fibrin(ogen) levels are reduced; Panel C, clot firmness is restored by increased fibrin interaction in the presence of fewer platelets.



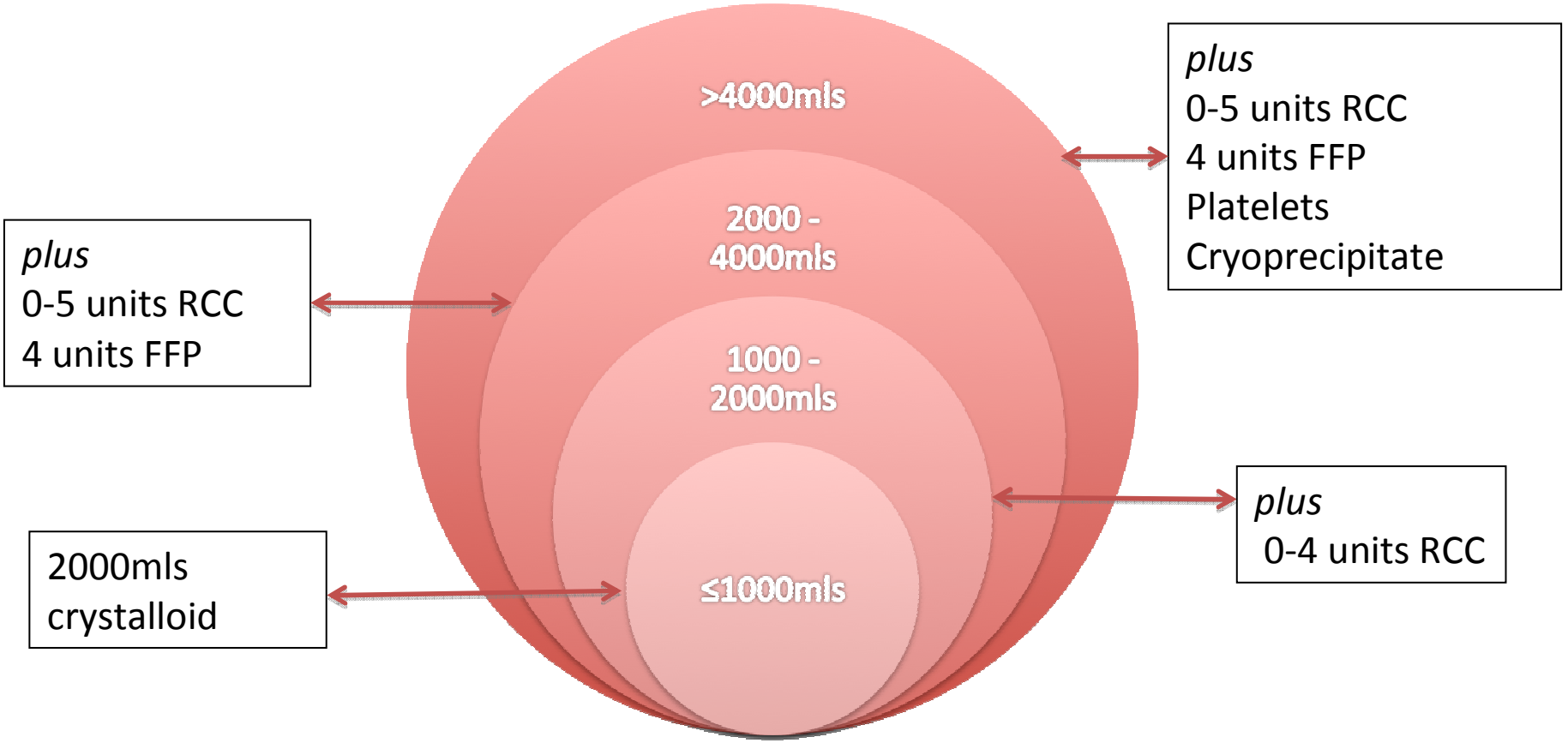
Putting it all back together again

Whole Blood Composition Compared with Component Therapy

	Whole Blood (1000 mL)	Component Therapy (1000 mL) [2 units PRBC + 1 unit platelets + 1 unit FFP]
Haematocrit	38-50%	28%
Platelets (K/µL)	150-400	90
Plasma Coagulation Factors	100%	70%
Fibrinogen (g/L)	3-6	5

Blood sampling after every 5 units RCC

Check FBC, fibrinogen, PT/aPTT, blood gases including lactate, Ca and K



How quickly can I get blood

- O negative - should be immediate (local fridge)
- Group specific blood – 15 minutes ***after*** G&S sample received by lab
- Cross matched blood – 45 minutes ***after*** G&S sample received by lab

Remember portering time

Monitor the resuscitation

- Assess for shock and effectiveness of resuscitation : regular and **repeated** obs
- Respiratory rate and capillary refill useful signs
- Don’t rely on systolic BP as main sign
- Measure and record urine output
- Document resuscitation and treatment

Resuscitation Targets

Measurement	Target	Why
Heart rate	< 100	Adequacy of fluid resuscitation and DO_2
Blood pressure (systolic)	80-100mmHg	Adequacy of fluid resuscitation
Hb (HCT)	10 (30)	Optimal for DO_2 and clotting
Platelets	≥ 75	Clotting
Fibrinogen	≥ 2g	Clotting
PT/APTT	< 1.5 x control	Clotting
Lactate	≤ 2.5mmol/L	Adequacy of fluid resuscitation and DO_2
Base deficit	≤ -2.0 mEq/L	Adequacy of fluid resuscitation and DO_2
Calcium	>1.1 mmol/L	Clotting
Temperature	$>35^0C$	Clotting

Stop the bleeding

- Treat for atony
  - empty bladder
  - uterine compression
  - commence uterotonic therapy
- Transfer to theatre for EUA
- Continue resuscitation including blood therapy

Treatment prior to a peripartum hysterectomy for a PPH.

Knight et al BJOG 2007

Therapy	Uterine atony alone ($n = 137$), n (%)
Syntocinon infusion	126 (92)
Ergometrine	84 (61)
Prostaglandin F2α	104 (76)
Misoprostol	22 (16)
Bimanual compression	9 (7)
Intrauterine balloons	43 (31)
B-Lynch or brace suture	34 (25)
Uterine or iliac artery ligation	18 (13)
Factor VIIa	16 (12)
Intra-abdominal packing	18 (13)
Uterine artery embolisation	5 (4)
Other	10 (7)

World Maternal Antifibrinolytic Trial

Tranexamic acid for the treatment of postpartum haemorrhage: an international randomised, double blind placebo controlled trial

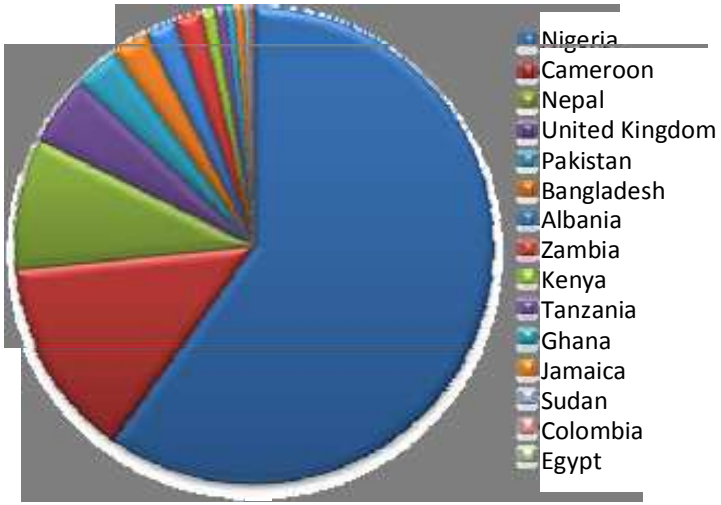
CLINICAL TRIAL PROTOCOL

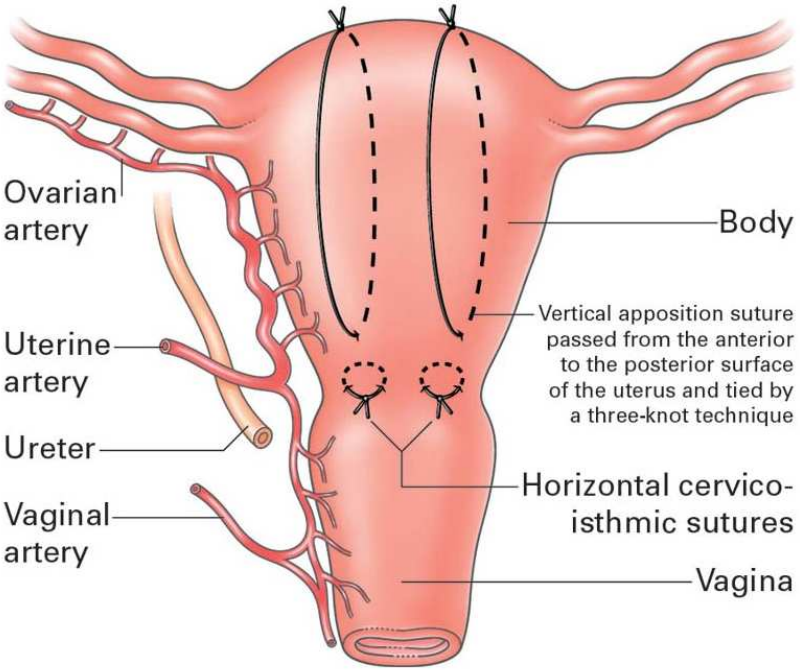
Protocol Number: ISRCTN76912190

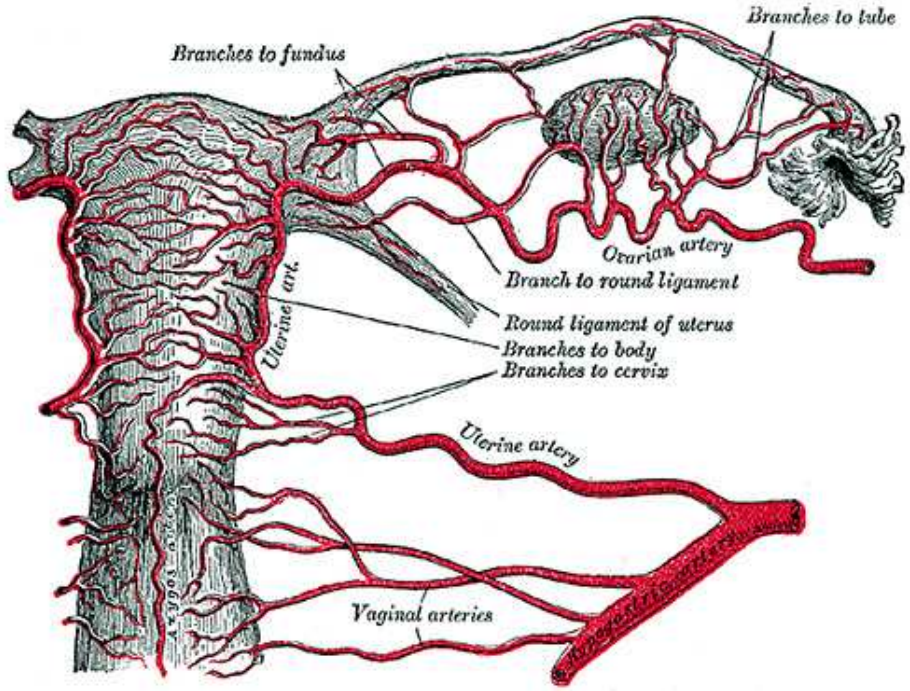
	NUMBER	DATE
FINAL VERSION	Version 1.0	11 May 2009
AMENDMENT (if any)		

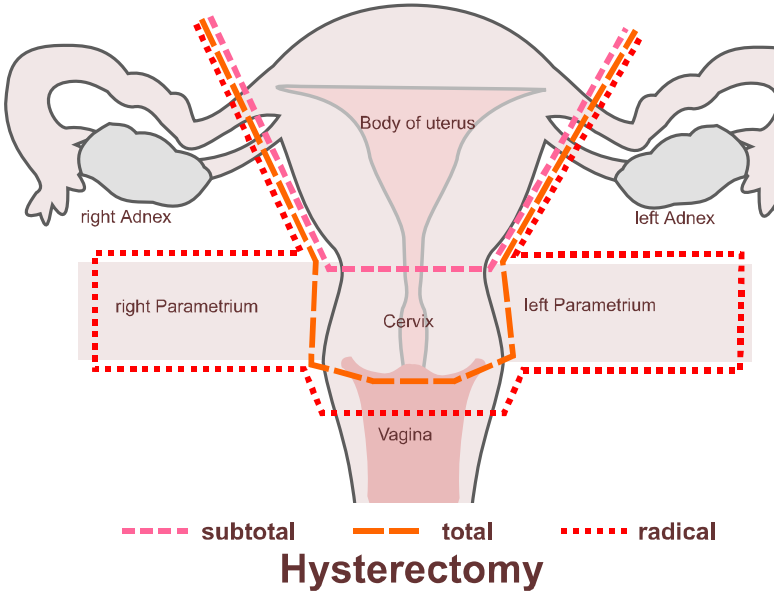
- **All women diagnosed with PPH**
- **Treatment:**
  1G tranexamic acid IV or placebo, repeat if required after 30 mins or within 24 hours
- **Outcome**
  Primary: Death or hysterectomy
  Secondary: includes blood transfusion
- 12,245 women so far (target 20,000)

RECRUITMENT BY COUNTRY

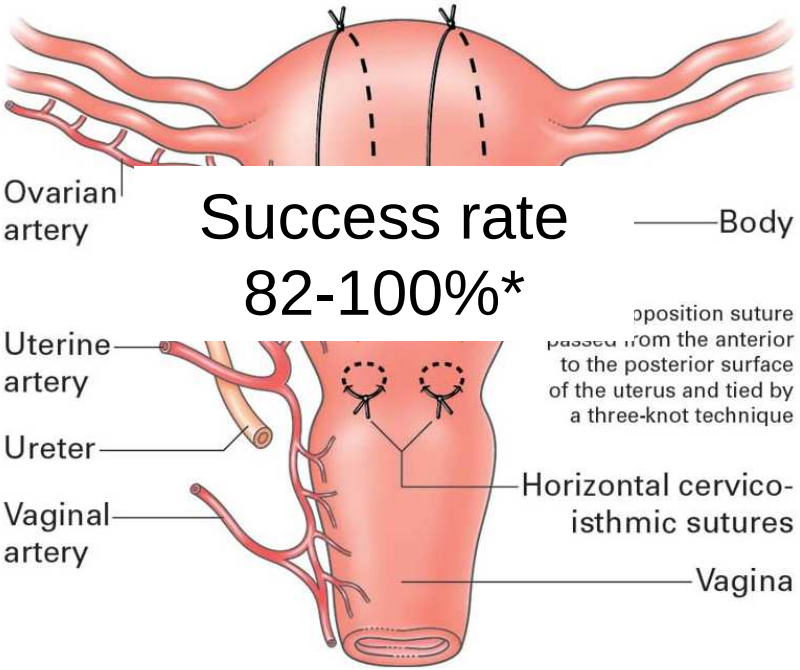




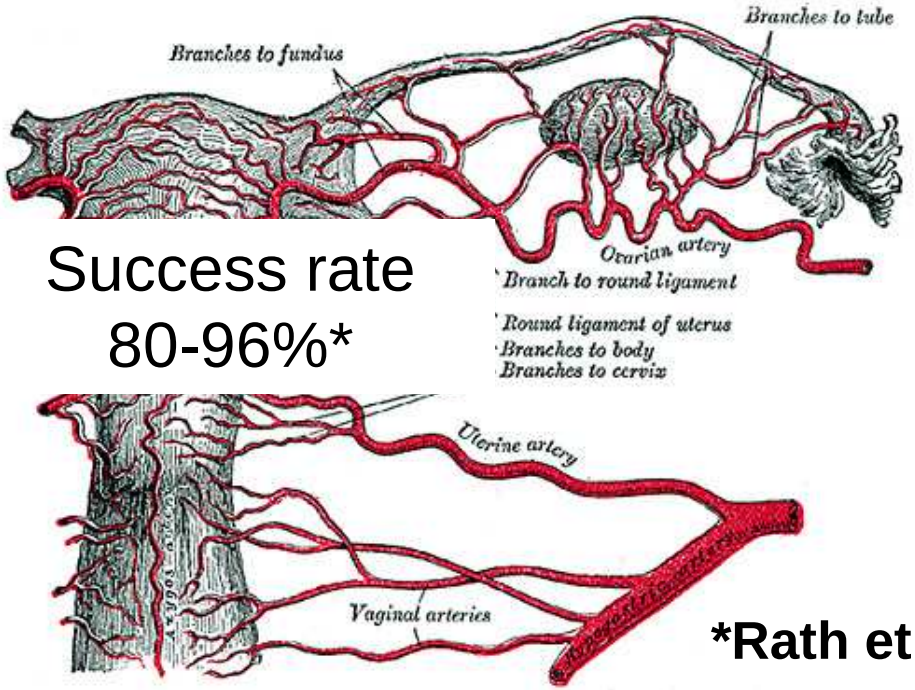




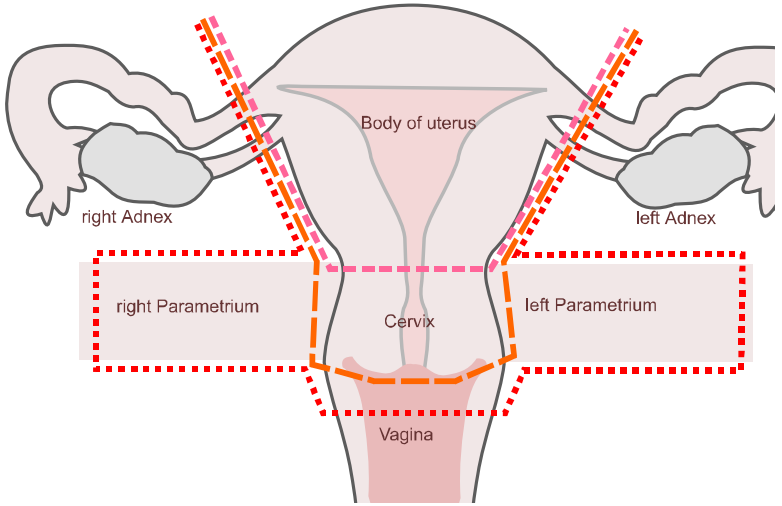
Success rate
87-91%*



Success rate
82-100%*



Success rate
80-96%*



*Rath et al 2012

Other interventions

What to consider afterwards

- ICU admission
- Hyperbaric therapy (for JW?)
- Thromboprophylaxis
- Anaemia management
  Erythropoietin 300U/kg x3 per week
  Iron supplementation (IV iron sucrose 200mg x3 /week)
- Patient counseling
- Team debriefing

Management of Major Obstetric Haemorrhage

- Be prepared
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components
  - Communication
  - Resuscitation
  - Monitoring
  - Treatment

Management of Massive Obstetric Haemorrhage

- Be prepared – Practise drills, Risk assess
- Diagnose and declare
- Instigate immediate management
- 4 key simultaneous components

  Communication - Get help

  Resuscitation - Give fluid early

  Monitoring - Assess and Reassess

  Treatment - Treat for atony

Making it work

Skills for multidisciplinary teamwork and communication

Crisis Preparation

Crisis Management

Good Team Work

The Team Leader

Good Communication

Improving team working and communication skills

Skills drills and simulation training

Communication aids

S — Situation:
I am (name), (X) nurse on ward (X)
I am calling about (patient X)
I am calling because I am concerned that…
(e.g. BP is low/high, pulse is XX temperature is XX, Early Warning Score is XX)

B — Background:
Patient (X) was admitted on (XX date) with
(e.g. MI/chest infection)
They have had (X operation/procedure/investigation)
Patient (X)'s condition has changed in the last (XX mins)
Their last set of obs were (XX)
Patient (X)'s normal condition is…
(e.g. alert/drowsy/confused, pain free)

A — Assessment:
I think the problem is (XXX)
And I have…
(e.g. given O_2/analgesia, stopped the infusion)
OR
I am not sure what the problem is but patient (X) is deteriorating
OR
I don't know what's wrong but I am really worried

R — Recommendation:
I need you to…
Come to see the patient in the next (XX mins)
AND
Is there anything I need to do in the mean time?
(e.g. stop the fluid/repeat the obs)

Ask receiver to repeat key information to ensure understanding

The SBAR tool originated from the US Navy and was adapted for use in healthcare by Dr M Leonard and colleagues from Kaiser Permanente, Colorado, USA